Second Embodiment

(Configuration of Second Embodiment)

[0087] FIG. **18** is a schematic circuit diagram illustrating a configuration of a surge protective system driven by a battery according to a second embodiment of the present invention, and common reference numerals are assigned to components common to those in FIG. **17** which illustrates the surge protective system driven by the external power supply in the first embodiment.

[0088] The surge protective system driven by a battery according to the second embodiment is configured to be driven by batteries **80** and **90** in place of the external power supply **5**.

[0089] The surge protective system according to the second embodiment includes a plurality of SPDs **1**A (for example, SPDs **1**A-**1**, **1**A-**2**, . . .) in each of which the battery **80** is incorporated, and a power supply unit **50**A in which the battery **90** is incorporated, and these are connected to each other with a plurality of juncture plugs **25** (for example, juncture plugs **25-1**, **25-2**, . . .).

[0090] Each of the SPDs **1**A (for example, SPDs **1**A-**1**, **1**A-**2**, . . .) includes an SPD side jack **10** and an SPD side plug **30**A in which the battery **80** is incorporated and which is detachably attached by insertion to the SPD side jack **10** as with the first embodiment.

[0091] While the SPD side jack **10** has the same configuration as that of the first embodiment, wire is connected such that the terminal parts **15-1**(**1**), **15-2**(**1**) and **16**(**1**) for supplying power are not used in terminals such as the juncture terminals **15-1** and **15-2** and the first connection terminal **16**, and only the terminal parts **15-1**(**2**), **15-2**(**2**) and **16**(**2**) and the terminal parts **15-1**(**3**), **15-2**(**3**) and **16**(**3**) are used.

[0092] While the SPD side plug **30**A has a case **31** which is the same as that in the first embodiment, the battery **80** (for example, DC 3 V) is stored within this case **31**. The battery **80** is detachably attached by insertion by a battery cover which is provided on a side wall of the case **31** and which is not illustrated being open and closed. By this battery **80**, the CPU **41** is driven. The switch **46** for display confirmation is connected to the CPU **41** to reduce power consumption, and, when this switch **46** is depressed, the LED **45***d* for displaying a remaining battery level within the display unit **45** becomes conductive. Further, after the switch **46** is depressed, for example, any one of the green LED **45***a* which displays a normal state, the yellow LED **45***b* which displays a replacement recommendation state and the red LED **45***c* which displays a degradation (failure) state is turned on for approximately one second. Other configuration of the SPD side plug **30**A is the same as that of the plug **30** in the first embodiment.

[0093] The power supply unit **50**A includes the power supply unit side jack **60** and a power supply unit side plug **70**A in which the battery **90** is incorporated and which is detachably attached by insertion to the power supply unit side jack **60** as with the first embodiment.

[0094] While the power supply unit side jack **60** has the same configuration as that of the first embodiment, because the external power supply **5** is not used, the external line side terminals **62-1** and **62-2** are not connected to the external power supply **5**. Further, wire is connected such that the terminal parts **65-2**(**1**) and **66**(**1**) for supplying power are not used in terminals such as the juncture terminal **65-2** and the first connection terminal **66**, and only the terminal parts **65-2**(**2**) and **66**(**2**) and the terminal parts **65-2**(**3**) and **66**(**3**) are used.

[0095] While the power supply unit side plug **70**A has a case which is the same case as that in the first embodiment, the battery **90** (for example, DC 3 V) is stored within this case. The battery **90** is detachably attached by insertion by a battery cover provided at a side wall of the case being open and closed. The battery **90** is connected between the CPU **75** and the earth terminal **64-2** and drives the CPU **75**. Other configuration of the power supply unit side plug **70**A is the same as that of the plug **70** in the first embodiment.

[0096] While the plurality of SPDs **1**A (for example, SPDs **1**A-**1**, **1**A-**2**, . . .) and the power supply unit **50**A are connected with the plurality of juncture plugs **25** (for example, juncture plugs **25-1**, **25-2**, . . .) as with the first embodiment, because power is not supplied from the power supply unit **50**A to each SPD **1**A, only terminal parts (**2**) and (**3**) of each juncture plug **25** are used.

(Operation of Second Embodiment)

[0097] As illustrated in FIG. **18**, (I) operation step 1 and (II) operation step 2 in the case where the plurality of SPDs **1**A perform protection operation against lightning surge in a state where the plurality of SPDs **1**A (for example, SPDs **1**A-**1**, **1**A-**2**, . . .) and the power supply unit **50**A are connected will be described.

(I) Operation Step 1

[0098] For example, when an excessive lightning surge occurs between the external line side line **2-1** or the equipment side line **3-1** and the earth terminal **14-2**, as with the first embodiment, the protection circuit **34** within the SPD side plug **1**A-**1** operates, and the surge current flows through the surge current pathway indicated with the arrow (**4**) and is discharged to the earth terminal **14-2**.

[0099] When the surge current is discharged to the earth terminal **14-2**, data of the surge current detected at the CT **43** is stored in the memory **42** through the CPU **41**. The CPU **41** determines a state of the SPD **1**A-**1** (that is, a state of the protection circuit **34**) by comparing the history of the lightning surge (such as, for example, a degree of the surge current and the number of times of intrusion) stored in the memory **42** with a reference value set in advance and stores the determination result in the memory **42**. When the switch **46** is depressed, the CPU **41** turns on any one of the green LED **45***a*, the yellow LED **45***b* and the red LED **45***c* of the display unit **45** according to the determination result stored in the memory **42**.

[0100] When, for example, it is determined that the SPD **1**A-**1** is recommended to be replaced or degrades, the CPU **41** puts the transistor **44** into an on state using a control signal. When the transistor **44** is put into an on state, the terminal part (**3**) and the terminal part (**2**) of the first connection terminal **16** become conductive, and a current flows through a current pathway for light emitting diode operation as indicated with the following arrow (**2**):

"Battery **90** of power supply unit **50**A→light emitting diode **72**→terminal part (**3**) of first connection terminal **66**→terminal part (**3**) of juncture terminal **65-2**→juncture plug **25-1**→terminal part (**3**) of juncture terminal **15** of SPD **1**A-**1**→terminal part (**3**) of first connection terminal **16**→transistor **44**→terminal part (**2**) of first connection